2a PG10791 PCT

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : B65D 81/38 // 6/00

A1

(11) International Publication Number: WO 99/57038

(43) International Publication Date: 11 November 1999 (11.11.99)

(21) International Application Number: PCT/SE99/00742

(22) International Filing Date: 4 May 1999 (04.05.99)

(30) Priority Data:
9801548-0 4 May 1998 (04.05.98) SE

(71) Applicant *(for all designated States except US)*: BOX MODUL AB [SE/SE]; Kabelgatan, S-934 00 Öjebyn (SE).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: LUNDSTRÖM, Rolf, Gösta [SE/SE]; Näckrosgränd 29, S-941 40 Piteå (SE).

(74) Agents: GRANSTRÖM, Lars-Eric et al.; AB Stockholms Patentbyrå, Zacco & Bruhn, P.O. Box 23101, S-104 35 Stockholm (SE).

(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published

With international search report.

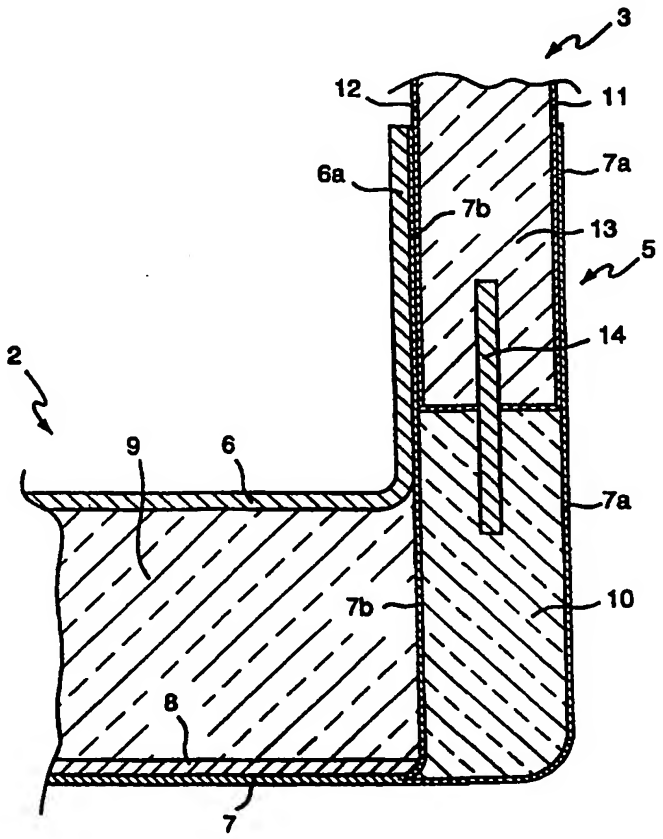
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

In English translation (filed in Swedish).

(54) Title: ELEMENT FOR A HEAT INSULATED CONTAINER

(57) Abstract

The invention relates to an element included in a heat-insulated container, preferably a floor element (2) where the element includes a first covering layer (6) that forms an inner layer of the container and a second covering layer (7) that forms an outer layer of the container plus at least one insulating material (9) arranged between these two, whereby the component parts of the element (2) are joined to one another by means of an adhesive substance. With heat-insulated containers constructed of so-called sandwich elements, it is especially difficult to achieve an arrangement at the locations where the elements are joined to one another so that the forces that arise can be transferred and accommodated alternately between the covering layers in the said joint locations where the binding elements meet, at the same time as heat conducting bridges are essentially avoided in these sections. The element according to the invention is distinguished in that at least one edge section of the element is designed as a groove (5) running along this edge section and that the side walls of the groove (5) consist of partial layers (7a, 7b) of at least the second covering layer (7).



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

Element for a heat insulated container

The present invention relates to an element for a heat-insulated container according to the introduction to claim 1.

Surface sandwich elements that are joined with one another at their edges are employed when manufacturing containers with a space that is heat-insulated. By the use of such sandwich elements, it is possible to achieve containers that combine the advantages of low weight, good heat insulation, excellent stiffness and rigidity as well as high resistance to knocks. The critical aspect of manufacturing containers composed of sandwich elements is to design these in such a way that they can be joined to one another at their edges so that the forces that arise in the locations of the joints can be transferred and accommodated alternately between the covering layers in the said joint locations, at the same time as heat conducting bridges are essentially avoided in these sections. Until now, the mutual jointing of the elements has usually been accomplished by means of cross bar ties, preferably of wood or metal, that have had the advantage that the forces can be fully satisfactorily exchanged between the covering layers in the joint locations, but the disadvantage that these beams, such as those made of wood, for example, have insulating characteristics that are much too poor to be an acceptable solution. A further disadvantages of the said cross bar ties is that the manufacturing procedure when joining the elements together is of a hands-on nature and thus results in a much too great a working input to be acceptable.

A heat-insulated container where the wall elements in the area of the lower joint location have tightening devices that link the inner respectively outer covering layers by means of a traction force that is active between them is previously known from SE-C-503 207. In this way, it is possible to join the connecting floor elements running along the lower edges of the container with the wall element in a way that is supportive and that transfers forces, which means in principle that forces acting at the joining locations of the elements can be alternately transferred between the covering layers. This known container is, however, a complicated construction, as a number of tightening devices at specified distances from one another must be arranged along the lower edge of each wall element.

A container for transporting goods that are sensitive to heat or cold is previously known from WO 92/15506. A distinguishing feature of this container is the construction design of the corner sections, whereby the said corner sections include a metal profile, preferably of aluminium, that in general has an F-shaped cross-section. By suitably adapting the sizes of the parts of the F-shaped profile, metallic contact between the inner and outer sides of the container is avoided. This known construction design is, however, primarily

intended to confer good insulating characteristics, while the load accommodating characteristics have not received equal attention.

An insulating container with elements where the reinforcing covers consist of corrugated paper and the insulation of expanded polystyrene is previously known from GB-A-2 028 277. One distinguishing attribute of this container is that is can be folded. Another important feature of the said container is that the contents do not come into contact with the expanded polystyrene insulation. The sizes of this container are relatively small, which is why the problems around which the present invention is focused are not found in an equivalent manner in the container according to GB-A-2 028 277.

A primary objective of the present invention is to achieve an element of the type defined initially that is designed so that it has very good rigidity in all directions and, that in order to form a container with enclosing wall sections, it allows further elements to be joined at the edges of the said element whereby forces arising at the location of the joints can be alternately transferred between the covering layers, at the same time as a good heat insulation is guaranteed at the said location of the joints. A further objective of the present invention is to achieve an element that is designed so that it can partly accommodate a point load of a certain size and partly accommodate a spread-out load of a certain size without its deflection exceeding more that a predetermined set value.

The objectives of the invention named above are achieved by it having the features and characteristics stated in claim 1.

The invention will be described below in the form of a non-limiting example of an embodiment based on the enclosed drawings where; **Fig. 1** shows an exploded view of a container that includes a floor element according to the present invention, whereby the end section element has been omitted for reasons of clarity; **Fig. 2** shows a cross-section along line II-II in Fig. 1; and **Fig. 3** shows a longitudinal section along line III-III in Fig. 1.

The container 1 shown in Fig. 1 includes a floor element 2, two wall elements 3 and a lid element 4. The end section element has been omitted for reasons of clarity. As is evident from Fig. 1, the longitudinal edge sections of the floor element 2 and the lid element 4 are provided with grooves 5 whose construction design will be described in more detail later in connection with Fig. 3. The grooves 5 are dimensioned so that they can accommodate the lower respective upper longitudinal edges of the wall elements 3 with a tight fit. This is evident in more detail from Fig. 3. It is evident from the cross-section through the floor element 2 according to the invention shown in Fig. 2 that this includes a first upper covering layer 6 seen in the figure that forms an inner layer in the container, and a second lower

covering layer 7 that forms an outer layer of the container, whereby a reinforcing/strengthening layer 8 is arranged between the said covering layers 6, 7 as a trapezium-shaped or wave-like form and extending across the longitudinal direction of the floor element 2. Rods 9 of insulating material are arranged in the spaces that are formed between the between first and second reinforcing covers 6, 7 and the reinforcing layer 8, whereby the said rods have a cross-sectional shape that dictates the form of the reinforcing layer 8, i.e. if the insulating rods 9 have a trapezium-shaped cross section, the reinforcing layer 8 will have an equivalent trapezium-shape, see Fig. 2.

Covering layers 6, 7 and the reinforcing layer 8 are executed in fibre-reinforced plastic material, preferably a glass-fibre-reinforced thermosetting plastic. The insulating rods 9 are preferably made in a foam material, for example PVC foam or polystyrene foam.

As is evident from Figs. 1 and 3, floor element 2 also includes upward facing open grooves 5 in the areas of its longitudinal edges. The said grooves 5 are designed so that the second lower covering layer 7 is divided into two partial layers, 7a and 7b respectively, in the areas of the said longitudinal edges and that these run parallel with one another and at a distance from one another in a direction that is at right angles to the main plane of floor element 2, whereby the said partial layers 7a and 7b extend above the main plane of the first upper covering layer 6. As is evident from Fig. 3, a space is formed between the said partial layers 7a and 7b, whereby the lower part of the said space accommodates an insulating rod 10 with an essentially rectangular cross-section. The extension of partial layers 7a and 7b above the rectangular insulating rod 10 means that a groove 5 is formed, whereby partial layers 7a and 7b comprise the limiting walls of the grooves 5. As an extra strengthening measure, a section 6a of the upper covering layer 6 extends upwards along the inside of the partial layer 7b, thus forming an edging that withstands knocks and bumps within a container formed in this way. It should be realised that the mutual reaction, and through this means the interchange of forces between covering layers 6, 7 at the location of joints between the floor element 2 and the wall element 3 that joins to this, is essentially achieved by the partial layer 7b extending between the said covering layers 6 and 7. Buckling or deformation of the said partial layer 7b is effectively countered by the bracing effect due to the insulation rods 9 and 10 located on either side of the partial layer 7b and by the interaction of the trapezium-shaped reinforcing layer 8 that extends at right angles to the partial layer 7b.

According to the invention, the manufacture of the floor element 2 preferably takes place in principle in the following way. The component parts included in floor element 2 are oriented in position relative to one another in a way so that the construction shown in

Figs. 2 and 3 is obtained, i.e. that the reinforcing layer 8 runs in a trapezium-like manner between insulating rods 9, whereby the core of the reinforcing layer 8 and insulating rods 9 is brought to lie between the upper and the lower covering layers 6 and 7 respectively. In addition, the component parts included in the construction of the longitudinal edge of the floor element 2 (see Fig. 3) are arranged relative to one another in the manner shown in Fig. 3. More specifically, covering layer 7 is divided into the partial layer 7a and 7b named above to form the space into which the rectangular cross-sectioned insulating rod 10 is placed.

To join the component parts included in the floor element 2 to one another, the technique known as vacuum injection is normally used, which in principle comprises the following steps; the component parts included in the floor element 2 are placed next to one another and aligned in position and are then sealed in an air-tight casing. Air is then evacuated from the casing, preferably at one end of the casing, at the same time as an adhesive substance is drawn in to the casing, preferably at the other end of the casing. In this way, the adhesive substance is applied to the surfaces between the different component parts and is accommodated in the space between the fibres as the vacuum or, more specifically the under pressure, is maintained inside the casing. A floor element of the type shown in Fig. 2 and 3 is obtained when the adhesive substance has set. More specifically, via the adhesive substance, the floor element 2 on the inside of the first upper covering layer 6 is partly joined with the upper flange section of the outer side of the reinforcing layer 8 and partly with the broader upwards facing abutting sections of the insulating rods 9 shown in Fig. 2. It is, of course, possible to reverse this and position the reinforcing layer 8 so that it binds with the broader sections of the insulating rods 9. Via the adhesive substance, the inside of the second lower covering layer 7 shown in Fig. 2 and 3 is partly joined with the lower flange section of the outer side of the reinforcing layer 8 and partly with the broader downwards facing abutting sections of the insulating rods 9 shown in Fig. 2. Both sides of the mid sections of the reinforcing layer 8 are joined via the adhesive substance with the insulating rods 9 while the insides of the upper and lower flange sections of the reinforcing layer 8 are joined via the adhesive substance with the comparatively narrow abutting sections of the insulating rods 9. The sides of the partial layers 7a and 7b that face one another are joined via the adhesive substance with the mainly rectangular insulating rods 10 and the opposite side of partial layer 7b is joined via the adhesive substance with the end surfaces of the insulating rods 9. The folded-up section 6a of the upper covering layer 6 is joined via the adhesive substance with the side of the partial layer 7b that faces away from the groove 5. The adhesive substance suitably includes that known as thermosetting resin.

The principles of the design construction and manufacture of a floor element 2 for the container 1 according to the invention and shown schematically in Fig. 1 have been described above. As the floor element 2 is the part of the container 1 that is exposed to the greatest stresses, it is naturally important that this element has a design construction according to the principles of the invention. Regarding the other elements included in the container 1, it can also be suitable for the lid element 4 to have a design construction like that described above for the floor element 2. The lid element 4 can naturally be designed in the same way as the floor element 2 if this is considered to be recommended, for example with regard to the stresses to which the lid element can be subjected. However, the invention is primarily aimed at achieving an element that is suitable as a floor element 2 in a container 1. When designing such a container, it can thus be considered giving the lid element 4 a simpler design construction than the floor element 2 as the lid element 4 is normally exposed to less stress than the floor element 2.

Regarding the wall element 3, it can also be considered giving these a design construction equivalent to that described for the floor element 2 for certain applications. However, it is not normally necessary to design the sizing of the wall elements 3 so that they are as robust as the floor element 2 as they do not have to accommodate as large stresses compared with floor element 2. For this reason, wall element 3 is normally given a simpler design construction compared with floor element 2.

As has been pointed out above, the end section wall elements have not been shown in Fig. 1 for reasons of clarity. In this context, it should also be pointed out that the said end section wall elements do not need to be designed like the floor element 2 for the same reasons given regarding the wall elements 3 and the lid element 4. Joining the end section wall elements to the other elements 2-4 can take place in a variety of ways and is thus not a subject of the present invention.

Assembling the floor element 2, the wall elements 3 and the lid element 4 takes place in principle in the manner shown in Fig. 1, i.e. the lower edges of the wall elements 3 are accommodated in the upwards facing open grooves 5 of the floor element 2 while the upper edges of the wall element 3 are accommodated in the downwards facing open grooves 5 of the lid element 4. In this way, the outsides of covering layers 11 and 12 of the wall element 3 join with the insides of partial layers 7a and 7b, whereby these layers are joined with one another by means of an adhesive substance such as a conventional glue, for example. An insulating material 13 is arranged between covering layers 11 and 12. In order to provide an extra secure attachment and to allow the wall element 3 to be guided into the correct position

in groove 5, a wedge 14 is cast or firmly attached by gluing with the rectangular insulating rods 10 where the said wedge 14 extends upwards into a cavity in the wall element 3 and in which cavity it is similarly firmly bound by gluing. At the connection with the wall element 3, the groove 5 functions as a U-shaped beam, i.e. it provides rigidity to the edge sections of the floor element 2 in the longitudinal direction of the groove 5. As the partial layers 7a, 7b of the groove 5 are joined with the covering layers 11, 12 of the wall element 3, a box beam-like construction is formed at the edge section of the floor element 2. The drawn-up part 6a of the upper covering layer 6 provides further rigidity to the box beam-like construction, as indicated above, and in addition, it serves as a kind of protection against knocks.

Making the floor element 2 more rigid in the other direction, i.e. a direction at right angles to the longitudinal direction of the grooves 5, is taken care of by the trapezium-shaped reinforcing layer 8 and its interaction with the insulating rods 9. Due to the combination of the box beam-like construction at the edge sections of the floor element 2 and the trapezium-shaped reinforcing layer 8 running at right angles to the longitudinal direction of grooves 5, an element that has a very good resistance to bending in all directions is achieved.

In the example of the embodiment of the invention shown here, neither the floor element 2, wall elements 3 nor the lid element 4 contain any metallic material, which means that a container 1 made in this way has first class insulating properties providing, of course, that the end section walls do not contain any metallic material either.

In cases where the main aim of the invention is to achieve a container with a construction that has exceptionally good rigidity and where the insulating properties are not assigned equal importance, it can, within the scope of the invention, be considered making the covering layer and the reinforcing layer of a metallic material such as aluminium. It should, however, be pointed out that the insulating properties of a container of this type primarily depend on the thickness of the insulation and that the material of the covering layer is significantly less important.

Within the scope of the invention, it can also be considered that the insulating material 9, 10, 13 can have different densities and thus different characteristics regarding insulating ability and the ability to bear loads. A combination of insulating material with different densities, even in one and the same element, allows the element to be "tailor-made" for a specific application. In addition, it is also possible for the covering layer to include more materials than the fibre-reinforced thermosetting plastic shown here, such as slabs of wood fibre, for example.

The invention is nevertheless not limited to that shown in the drawings and described here, but it can be changed and modified in a variety of different ways within the scope of the concept of the invention stated in the following claims.

Claims

1. Element for a heat-insulated container, preferably a floor element (2) where the element includes a first covering layer (6) that forms an inner layer of the container and a second covering layer (7) that forms an outer layer of the container plus at least one insulating material (9) arranged between these two, whereby the component parts of the element (2) are joined to one another by means of an adhesive substance, whereby at least one edge section of element (2) is formed as a groove (5) running along the edge c h a r a c t e r i s e d in that the side walls of the groove (5) consist of partial layers (7a, 7b) of at least the second covering layer (7) and that one of the partial layers (7b) is joined to the first covering layer (6).

2. Element according to claim 1 c h a r a c t e r i s e d in that the groove (5) is intended to accommodate a connecting element (3).

3. Element according to claim 2 c h a r a c t e r i s e d in that the partial layers (7a, 7b) run parallel with one another and at a distance from one another at right angles to the main plane of element (2) and that the second partial layer (7a) encloses part of the connecting element (3) when it is accommodated in the groove (5).

4. Element according to any of the previous claims c h a r a c t e r i s e d in that a rod-shaped insulating material (10) is accommodated in the lower part of the groove (5) in the space between the partial layers (7a, 7b) and whose cross-sectional shape defines the shape of the groove (5).

5. Element according to any of the previous claims c h a r a c t e r i s e d in that a trapezium-shaped or wave-like reinforcing layer (8) is arranged between the first and the second covering layers (6, 7) and joined with the first and the second covering layers (6, 7) and that the trapezium-shaped or wave-shaped profiles have a longitudinal direction running at right angles to the longitudinal direction of the grooves (5).

6. Element according to claim 5 c h a r a c t e r i s e d in that the insulating material (9) between the covering layers (6, 7) includes a number of rods (9) extending in the space between the reinforcing layer (8) and both covering layers (6, 7), whereby the cross-sectional shape of the insulating rods (9) defines the shape of the reinforcing layer (8).

7. Element according to any of the previous claims c h a r a c t e r i s e d in that the partial layers (7a, 7b) defining the grooves (5) extend somewhat beyond the main plane of element (2) and that one partial layer (7b) at the groove (5) is joined to one partial layer (6a) of the first covering layer (6), whereby the said partial layer (6a) is joined with the said side wall (7b) so that is transfers forces to it.

8. Element according to any of the previous claims c h a r a c t e r i s e d in that the covering layers (6, 7) consist of a fibre-reinforced plastic material.

9. Element according to any of the previous claims c h a r a c t e r i s e d in that the reinforcing layer (8) consists of a fibre-reinforced plastic material.

10. Element according to any of the previous claims c h a r a c t e r i s e d in that the adhesive material is a thermosetting plastic.

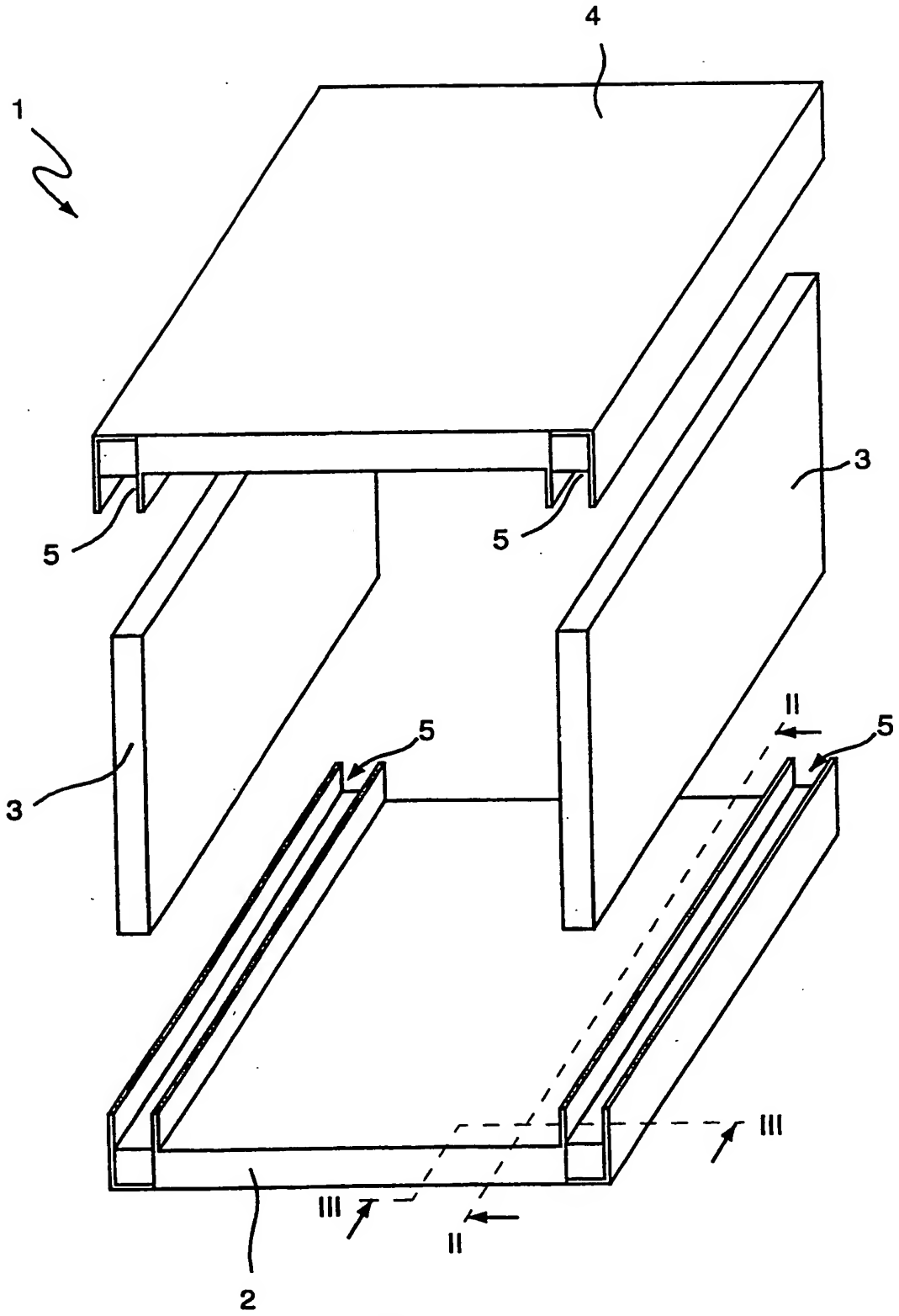


FIG.1

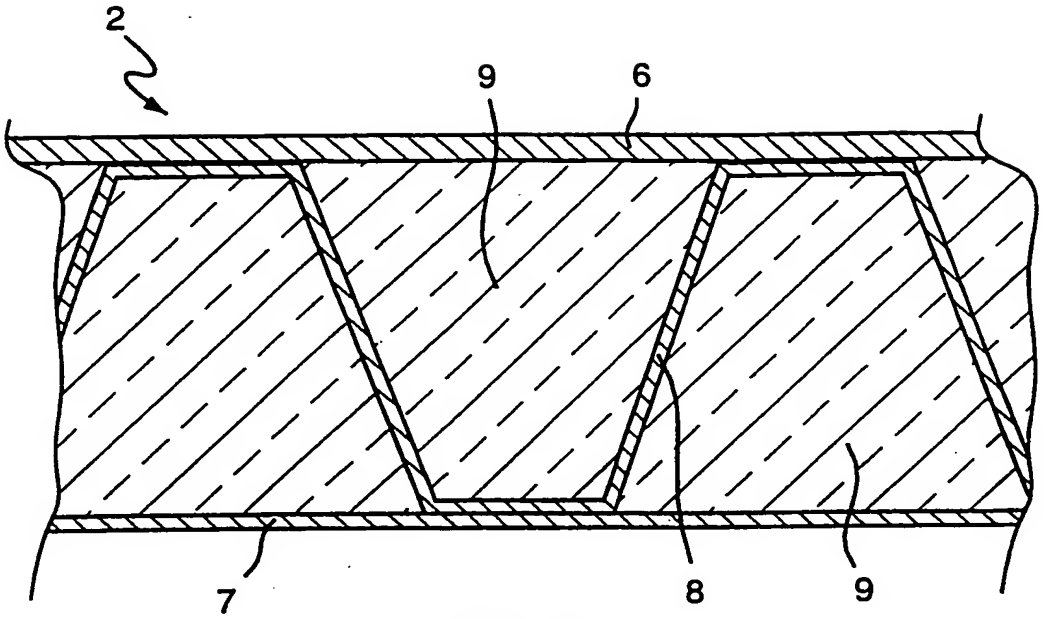


FIG.2

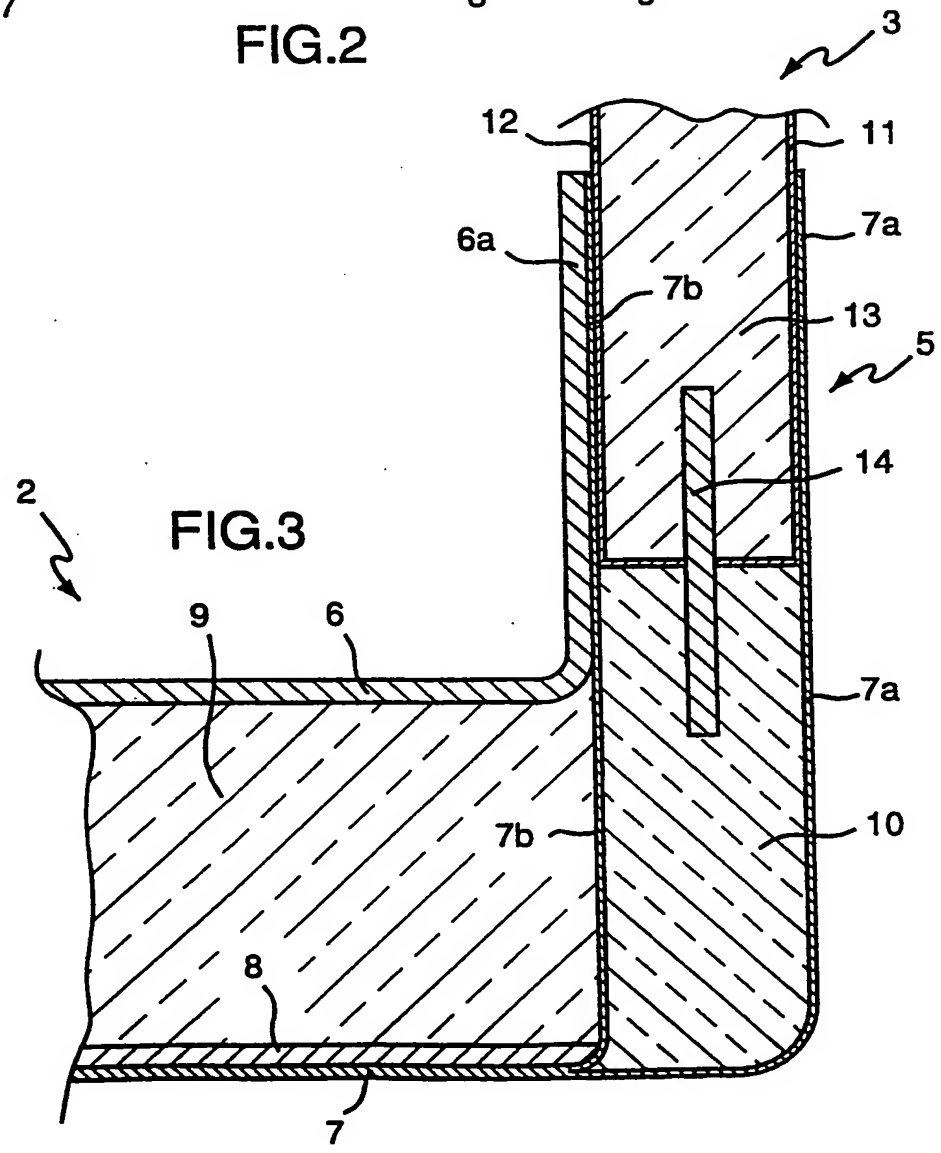


FIG.3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 99/00742

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B65D 81/38 // B65D 6/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5492267 A (HOLLANDER ET AL), 20 February 1996 (20.02.96), column 3, line 46 - line 49, figures 1, 8	1-10
A	US 5316171 A (DANNER, JR. ET AL), 31 May 1994 (31.05.94), abstract	1-10
A	US 5450977 A (MOE), 19 Sept 1995 (19.09.95), abstract	1-10
A	WO 9215506 A1 (EUROTAINER AB), 17 Sept 1992 (17.09.92)	1-10

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search
27 August 1999

Date of mailing of the international search report
21 -09- 1999

Name and mailing address of the ISA/
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. +46 8 666 02 86

Authorized officer
Inger Löfgren/CF
Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 99/00742

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	SE 503207 C2 (BOX MODUL AB), 15 April 1996 (15.04.96) --	1-10
A	GB 2028277 A (GMS S.A.(GENERAL MARKETING BROKERAGE S.A.)), 5 March 1980 (05.03.80) --	1-10

INTERNATIONAL SEARCH REPORT

Information on patent family members

02/08/99

International application No.
PCT/SE 99/00742

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5492267 A	20/02/96	US 5429264 A	04/07/95
		CA 1336770 A	22/08/95
		CA 1339311 A	19/08/97
		GB 2224565 A	09/05/90
		US 5000372 A	19/03/91
		US 5230941 A	27/07/93
US 5316171 A	31/05/94	NONE	
US 5450977 A	19/09/95	NONE	
WO 9215506 A1	17/09/92	AU 1334092 A	06/10/92
		DE 69117067 D,T	02/10/96
		EP 0553229 A,B	04/08/93
		JP 6501555 T	17/02/94
		SE 467106 B,C	25/05/92
		SE 9100649 A	25/05/92
		US 5716854 A	10/02/98
SE 503207 C2	15/04/96	AU 6940694 A	20/12/94
		SE 9301727 A	03/12/94
		WO 9427874 A	08/12/94
GB 2028277 A	05/03/80	DE 2852932 A	13/03/80
		FR 2434086 A	21/03/80